2014 Astrophysics Small Explorer (SMEX) and Mission of Opportunity (MO) Pre-Proposal Conference

Science Evaluation Overview

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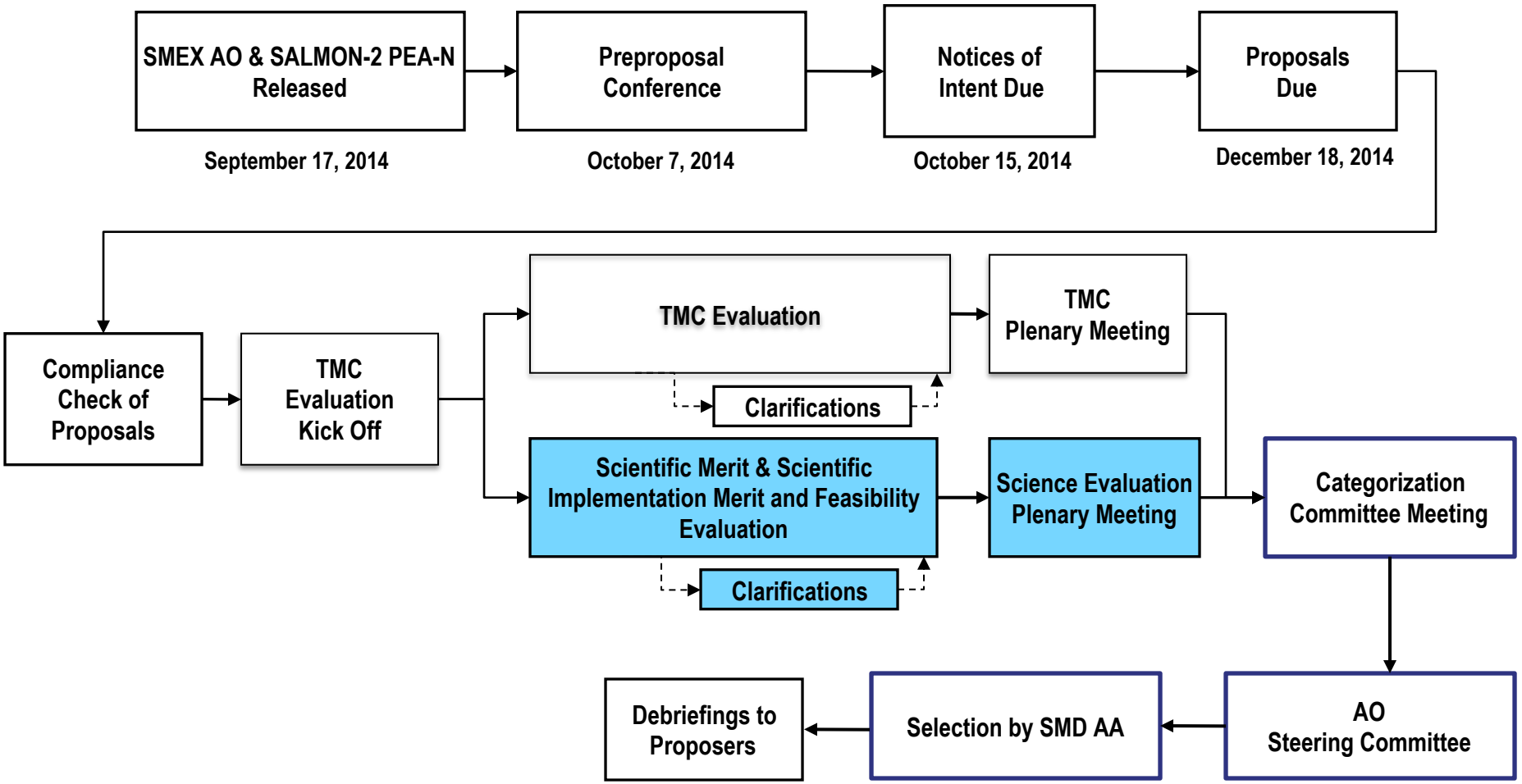
Science Evaluation Overview

Proposal Evaluation Flow



Science Requirements

- All investigations proposed in response to this solicitation must support the goals and objectives of the Astrophysics Explorers Program, and must be implemented by Principal Investigator (PI) led investigation teams.
- One of NASA's strategic objectives is to discover how the universe works, explore how it began and evolved, and search for life on planets around other stars.
- The NASA Science Mission Directorate (SMD) is addressing this strategic objective by conducting astrophysics investigations designed to address the following science goals:
  - Probe the origin and destiny of our universe, including the nature of black holes, dark energy, dark matter and gravity;
  - Explore the origin and evolution of the galaxies, stars and planets that make up our universe;
  - Discover and study planets around other stars, and explore whether they could harbor life.

References

- Further information on NASA's strategic goals may be found in NASA Policy Directive (NPD) 1001.0B, ***NASA 2014 Strategic Plan***, available through the Explorer Program Library.
- Further information on the goals and objectives of NASA's Astrophysics programs may be found in the ***NASA 2014 Science Plan*** and in ***Enduring Quests Daring Visions, NASA Astrophysics in the Next Three Decades***, available through the Program Library.

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Requirement 4: Proposals shall describe a science investigation with goals and objectives that address the program science objectives described in Section 2.

Requirement 5: Proposals shall clearly state the relationship between the science objectives, the data to be returned, and the instrument complement to be used in obtaining the required data (see Appendix B, Section D, for additional detail).

Requirement 6: Proposals shall include a plan to calibrate, analyze, publish, and archive the data returned, and shall demonstrate, analytically or otherwise, that sufficient resources have been allocated to carry out that plan within the proposed mission cost. The data plan shall discuss and justify any period of exclusive access to data (see Appendix B, Section E, for additional detail).

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Requirement 7: Proposals shall state the specific science objectives and their required measurements at a level of detail sufficient to allow an assessment of the capability of the proposed mission to make those specific measurements and whether the resulting data will permit achievement of these objectives (see Appendix B, Sections D and E, for additional detail).

Requirement 8: Proposals shall describe the proposed instrumentation, including a discussion of each instrument and the rationale for its selection.

Requirement 9: Proposals shall specify only one Baseline Science Mission and only one Threshold Science Mission.

Requirement 10: Proposals shall not include any descopes or other risk mitigation actions that result in the mission being unable to achieve the Threshold Science Mission objectives.

Scientific Merit Evaluation Factors

- The information provided in a proposal will be used to assess the intrinsic scientific merit of the proposed investigation.
- Scientific merit will be evaluated for the Baseline Science Mission and the Threshold Science Mission; science enhancement options beyond the Baseline Science Mission will not contribute to the assessment of the scientific merit of the proposed investigation.

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Factors for scientific merit:

<u>Factor A-1</u>. Compelling nature and scientific priority of the proposed investigation's science goals and objectives.

- This factor includes the clarity of the goals and objectives;
- how well the goals and objectives reflect program, Agency, and National priorities;
- the potential scientific impact of the investigation on program, Agency, and National science objectives;
- and the potential for fundamental progress,
- as well as filling gaps in our knowledge relative to the current state of the art.

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Factors for scientific merit:

Factor A-2. Programmatic value of the proposed investigation.

- This factor includes the unique value of the investigation to make scientific progress in the context of other ongoing and planned missions;
- the relationship to the other elements of NASA's science programs;
- how well the investigation may synergistically support ongoing or planned missions by NASA and other agencies; and
- the necessity for a space mission to realize the goals and objectives.

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Factors for scientific merit:

Factor A-3. Likelihood of scientific success.

- This factor includes how well the anticipated measurements support the goals and objectives;
- the adequacy of the anticipated data to complete the investigation and meet the goals and objectives; and
- the appropriateness of the mission requirements for guiding development and ensuring scientific success.

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Factors for scientific merit:

<u>Factor A-4</u>. Scientific value of the Threshold Science Mission.

This factor includes the scientific value of the Threshold Science Mission using the standards in the first factor of this section and whether that value is sufficient to justify the proposed cost of the mission.

Scientific Implementation Merit and Feasibility of the Proposed Investigation Evaluation Factors

- The information provided in a proposal will be used to assess merit of the plan for completing the proposed investigation, including the scientific implementation merit, feasibility, resiliency, and probability of scientific success of the proposed investigation.

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Factors for scientific implementation merit and feasibility:

<u>Factor B-1</u>. Merit of the instruments and mission design for addressing the science goals and objectives.

- This factor includes the degree to which the proposed mission will address the goals and objectives;
- the appropriateness of the selected instruments and mission design for addressing the goals and objectives;
- the degree to which the proposed instruments and mission can provide the necessary data; and
- the sufficiency of the data gathered to complete the scientific investigation.

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Factors for scientific implementation merit and feasibility:

Factor B-2. Probability of technical success.

- This factor includes the maturity and technical readiness of the instruments;
- the adequacy of the plan to develop the instruments within the proposed cost and schedule;
- the robustness of those plans, including recognition of risks and mitigation plans for retiring those risks;
- the likelihood of success in developing any new technology that represents an untested advance in the state of the art;
- the ability of the development team - both institutions and individuals - to successfully implement those plans; and
- the likelihood of success for both the development and the operation of the instruments within the mission design.

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Factors for scientific implementation merit and feasibility:

<u>Factor B-3</u>. Merit of the data analysis, data availability, and data archiving plan.

- This factor includes the merit of plans for data analysis and data archiving to meet the goals and objectives;
- to result in the publication of science discoveries in the professional literature; and
- to preserve data and analysis of value to the science community.

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Factors for scientific implementation merit and feasibility:

<u>Factor B-3</u>. Merit of the data analysis, data availability, and data archiving plan (continued):

- Considerations in this factor include assessment of planning and budget adequacy and evidence of plans for well-documented, high-level data products and software usable to the entire science community;
- assessment of adequate resources for physical interpretation of data;
- reporting scientific results in the professional literature (*e.g.*, refereed journals);
- and assessment of the proposed plan for the timely release of the data to the public domain for enlarging its science impact.

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Factors for scientific implementation merit and feasibility:

Factor B-4. Science resiliency.

- This factor includes both developmental and operational resiliency.
- Developmental resiliency includes the approach to descoping the Baseline Science Mission to the Threshold Science Mission in the event that development problems force reductions in scope.
- Operational resiliency includes the ability to withstand adverse circumstances, the capability to degrade gracefully, and the potential to recover from anomalies in flight.

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Factors for scientific implementation merit and feasibility:

Factor B-5. Probability of science team success.

- This factor will be evaluated by assessing the experience, expertise, and organizational structure of the science team and the mission design in light of any proposed instruments.
- The role of each Co-Investigator will be evaluated for necessary contributions to the proposed investigation;
- the inclusion of Co-Is who do not have a well defined and appropriate role may be cause for downgrading of the proposal.

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Factors for scientific implementation merit and feasibility:

<u>Factor B-6</u>. Merit of any science enhancement options (SEOs), if proposed.

- This factor includes assessing the appropriateness of activities selected to enlarge the science impact of the mission;
- the potential of the selected activities to enlarge the science impact of the mission; and
- the appropriate costing of the selected activities.
- The peer review panel will inform NASA whether the evaluation of the proposed SEO(s) impacted the overall rating for scientific implementation merit and feasibility.
- Lack of an SEO will have no impact on the proposal's overall rating for scientific implementation merit and feasibility.